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Sports, exercise and health science
Standard level
Paper 1

Thursday 19 May 2022 (morning)

45 minutes

Instructions to candidates

- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.
- The maximum mark for this examination paper is **[30 marks]**.

1. Which bones form part of the appendicular skeleton?
 - A. Sternum, clavicle, coccyx
 - B. Skull, clavicle, humerus
 - C. Clavicle, humerus, tibia
 - D. Skull, clavicle, sternum

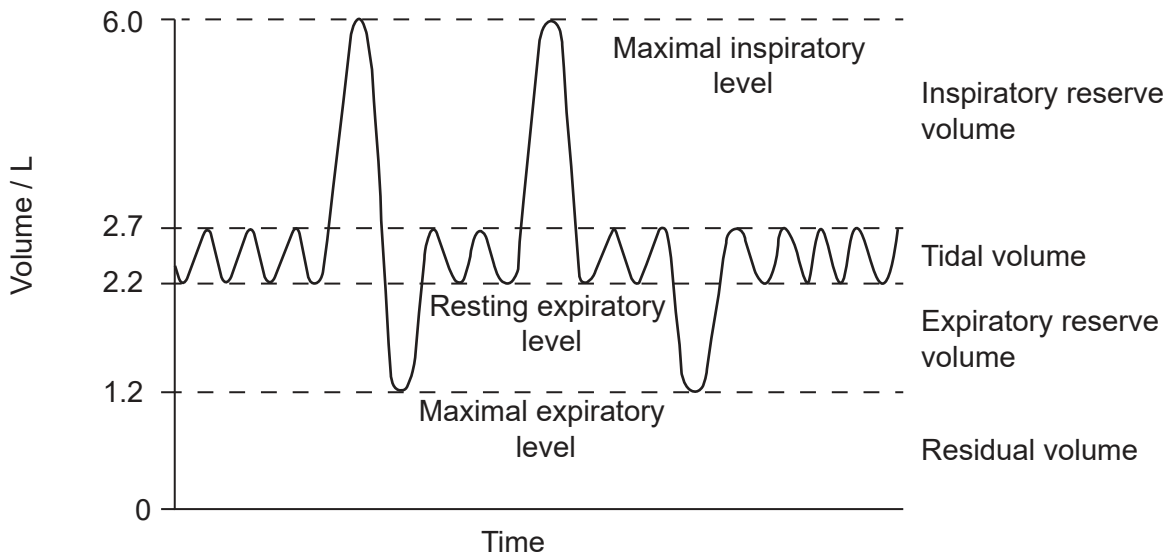
2. The diagram shows a gymnast performing a handstand. What is the position of the tarsals in relation to the femur?



- A. Superior
 - B. Inferior
 - C. Lateral
 - D. Medial

3. What is the function of a ligament?
 - A. To attach muscle to bone
 - B. To attach bone to bone
 - C. To reduce friction
 - D. To secrete synovial fluid

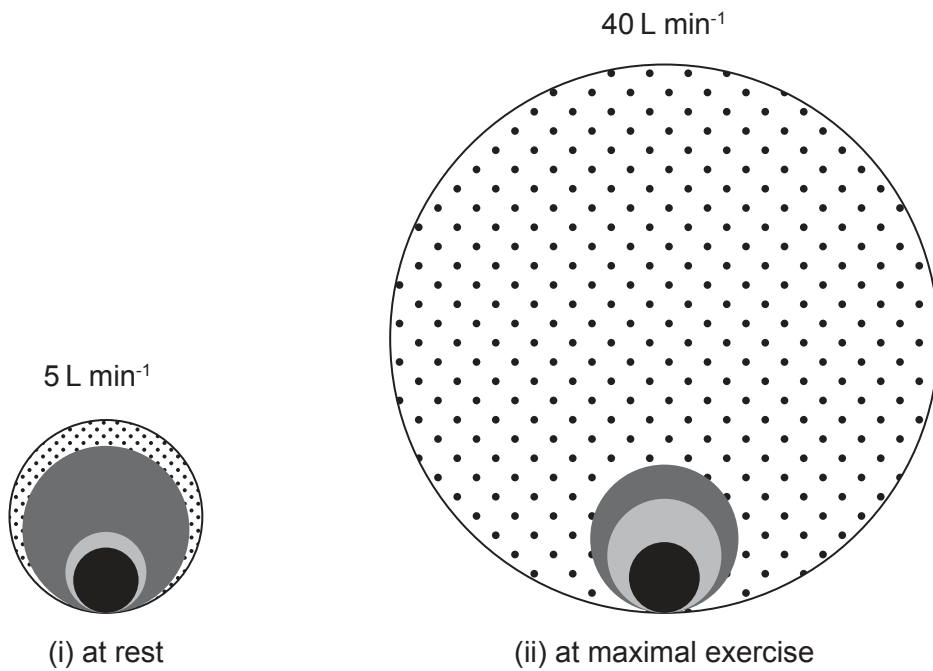
4. The diagram shows average respiratory volumes. What happens to the expiratory reserve volume (ERV) when an athlete begins to run?







- A. It increases until the residual volume is 0 litres.
- B. It decreases.
- C. There is no change.
- D. It increases but is limited by residual volume.
5. Which occurs during the inhalation phase of ventilation during exercise?
- | | | |
|----|---------------------------------|---|
| A. | increased pressure in the lungs | contraction of the internal intercostal muscles |
| B. | relaxation of the diaphragm | decreased volume in the lungs |
| C. | increased volume in the lungs | decreased pressure in the lungs |
| D. | contraction of the diaphragm | decreased airflow |
6. What blood vessel does the cardiovascular system use to send deoxygenated blood to the lungs?
- A. The aorta
- B. The vena cava
- C. The pulmonary vein
- D. The pulmonary artery

Turn over

7. The diagram represents blood flow in the heart, muscle, brain and skin of an athlete (i) at rest and (ii) at maximal exercise.



Key:

-  A.
-  B.
-  C.
-  D.

Which represents the blood flow for muscle when changing from rest to exercise?

8. Which describes the cardiac output of an athlete recovering from strenuous exercise?

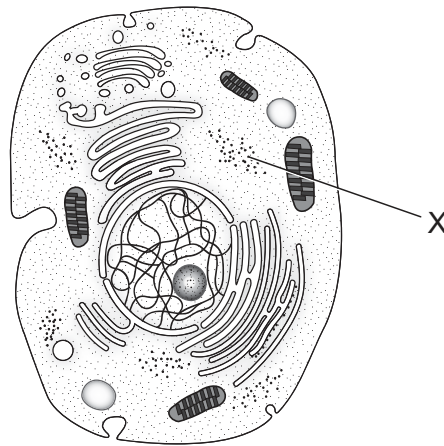
	Stroke volume (ml per beat)	Heart rate (bpm)
A.	decreasing	unchanged
B.	increasing	decreasing
C.	unchanged	decreasing
D.	decreasing	decreasing

9. The maximal oxygen uptake of an athlete when tested on a treadmill is measured to be $53 \text{ ml kg}^{-1} \text{ min}^{-1}$. What happens to this measurement when using an arm ergometer?
- A. It increases to 120%–130%.
 - B. It decreases to 70%–80%.
 - C. It remains unchanged.
 - D. It decreases to 20%–30%.
10. In percentage terms, which provides the greatest source of carbohydrate for an athlete?
- A. Avocado
 - B. Chicken
 - C. Potato
 - D. Olives
11. Which is formed from a catabolic reaction?
- A. Glucose
 - B. Glycogen
 - C. Adipose tissue
 - D. Protein
12. Which process occurs when blood glucose levels are decreased?
- A. Glycolysis
 - B. Lipolysis
 - C. Glycogenolysis
 - D. Glycogenesis

Turn over

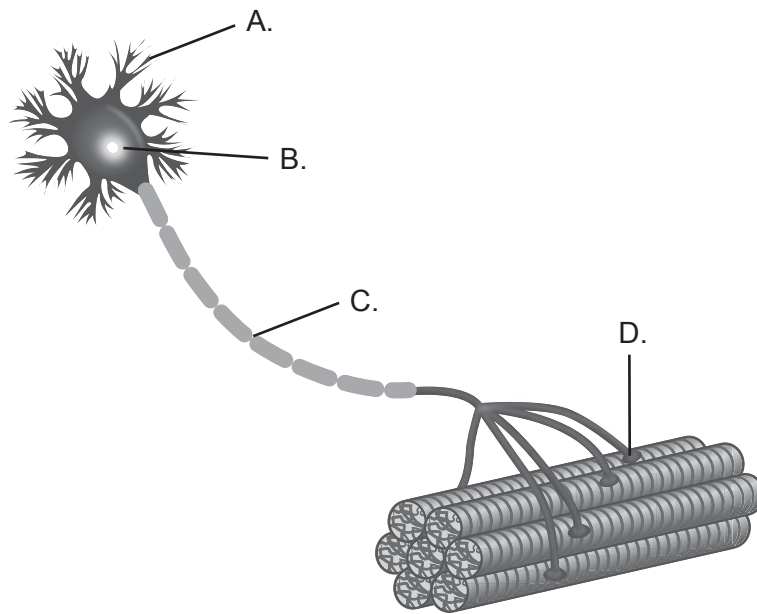
13. Which represents the production of adenosine triphosphate (ATP) via the aerobic glycolysis system?
- A. $PC + ADP \rightarrow 1ATP + C$
 - B. $glucose \rightarrow pyruvate \rightarrow 2 ATP + lactate + H^+$
 - C. $glucose \rightarrow pyruvate + O_2 \rightarrow acetylCoA \rightarrow Krebs\ cycle \rightarrow electron\ transport\ chain \rightarrow 38 ATP + H_2O + CO_2 + heat$
 - D. $ADP + P = ATP$

14. The diagram shows an animal cell. What is the function of X?

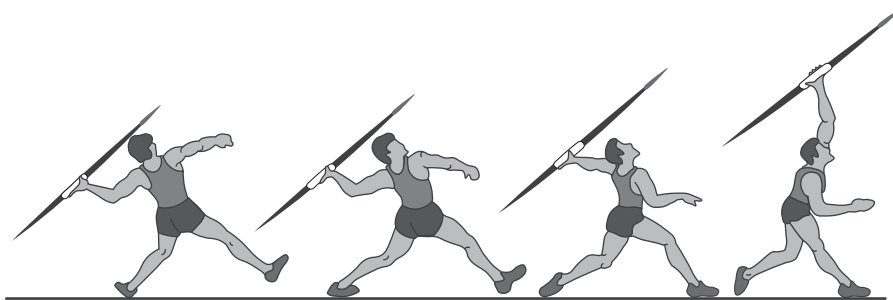


- A. Protein synthesis
- B. Controlling gene expression
- C. Cell respiration
- D. Ingestion and removal of waste

15. The diagram shows a motor unit. In which area does the neurotransmitter acetylcholine act?



16. The diagram shows an athlete extending their left elbow while throwing a javelin. According to the sliding filament theory, which occurs in the muscle fibres of the athlete's left triceps?



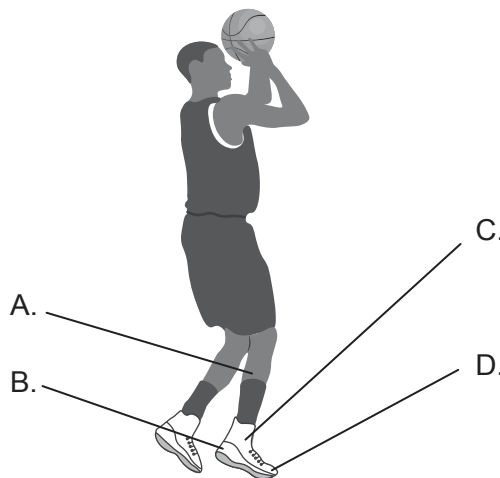
- A. The H zone increases.
- B. The A band shortens.
- C. The Z lines move closer together.
- D. The A band lengthens.

Turn over

17. The diagram shows a downhill speed skier. What type of muscle contraction occurs in the skier's quadriceps during this action?



- A. Isotonic eccentric
 - B. Isotonic concentric
 - C. Isokinetic
 - D. Isometric
18. In preparation for a downhill running event, what can an athlete do during initial training to prevent delayed onset muscle soreness (DOMS)?
- A. Reduce eccentric muscle actions.
 - B. Increase eccentric muscle actions.
 - C. Reduce concentric muscle actions.
 - D. Increase intensity of muscle actions.
19. Levers are working throughout the body when a basketball player performs a jump shot. Where is the effort applied in the lower right leg?

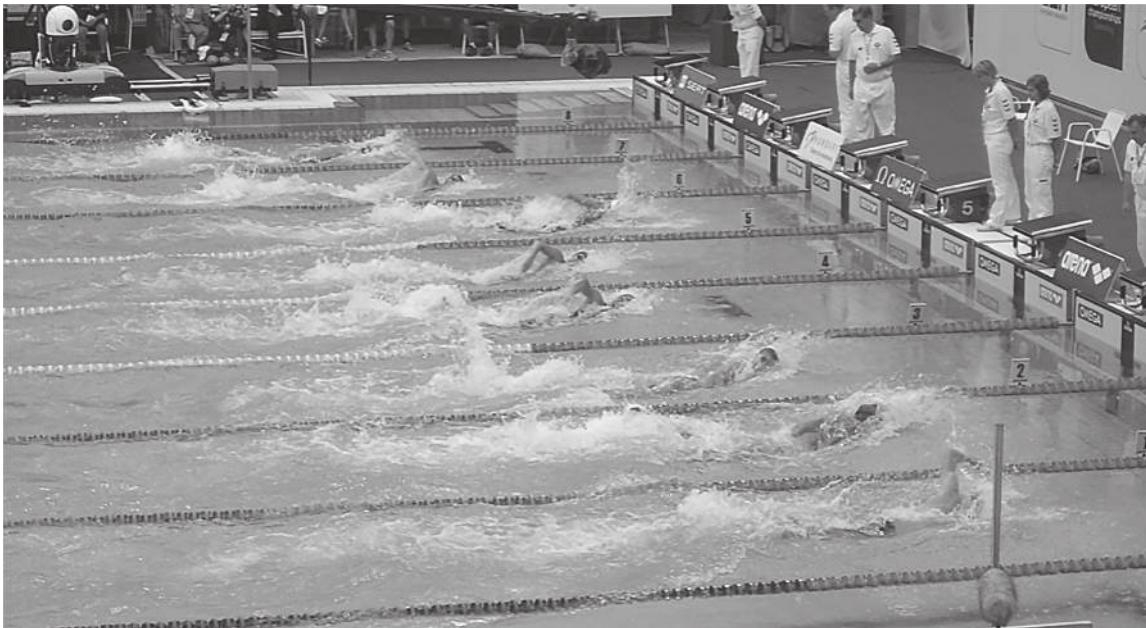


20. A ball hit during a game of tennis is subject to Newton’s laws of motion. What will increase the acceleration of the ball?

- I. Increasing the angular velocity of the racket head
- II. Increasing the force applied to the ball
- III. Increasing the mass of the ball

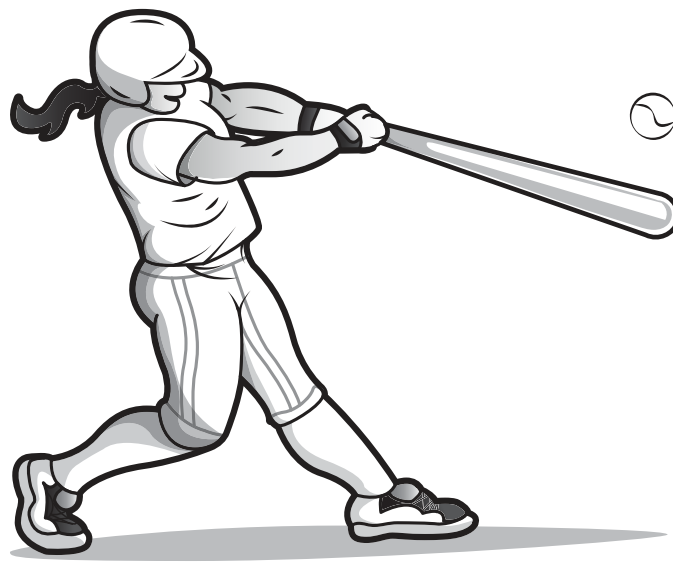
- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

21. The image shows a 100 m freestyle swimming race. What is the classification of motor skills for a competitor in this race?



- A. Interactive
- B. Discrete
- C. Fine
- D. Coactive

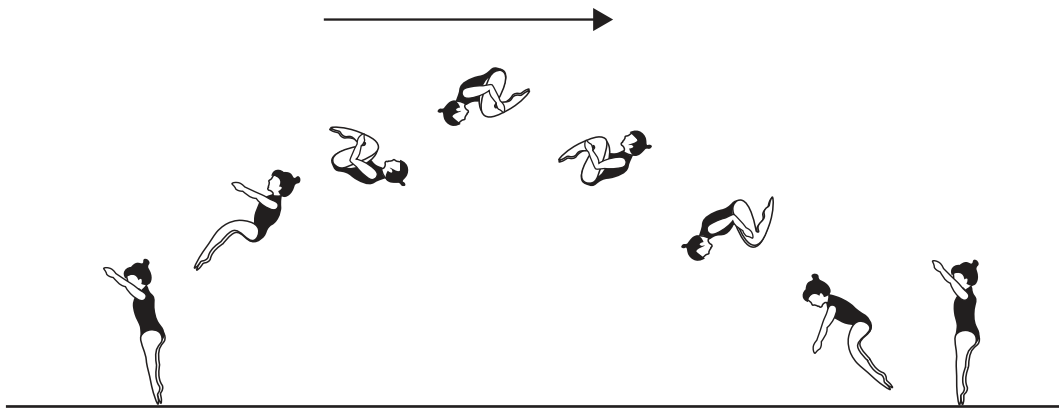
22. Which feature of Welford’s model of information processing is directly linked to short-term memory?
- A. Sensation
 - B. Perception
 - C. Output
 - D. Feedback
23. The diagram shows a baseball player. What type of sensor is used by a hitter to gain information regarding the flight of a baseball?



- A. Exteroceptors
 - B. Interoceptors
 - C. Chemoreceptors
 - D. Proprioceptors
24. Which is an example of reaction time at the start of a 100 m swimming race?
- A. The time it takes to sense the sound of the starter pistol.
 - B. The time from the sounding of the starter pistol to the initiation of movement.
 - C. The time taken to hear the starter pistol and complete the movement off the block.
 - D. The time taken to hear the starter pistol and enter the water.

25. The diagram shows a gymnast performing a tuck somersault.

What type of transfer occurs when a gymnast learns that forming a tuck in a somersault will reduce the moment of inertia and allow them to spin faster?



- A. Skill to skill
 - B. Practice to performance
 - C. Stage to stage
 - D. Principles to skills
26. Which best describes variable practice in ice hockey training?
- A. Practising shots on goal for 40 minutes.
 - B. Practising shots on goal for 5 minutes in between brief, competitive, small-sided games.
 - C. Practising shots on goal after moving through a series of markers.
 - D. Practising shots on goal while competing in small-sided games.
27. A researcher is designing a study to assess free-throw ability in basketball. How could they improve the reliability of the data?
- I. Increase the number of participants
 - II. Allow participants to record their own scores
 - III. Increase the number of trials per participant
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

Turn over

28. A series of fitness tests were conducted before and after a training programme to evaluate the effectiveness of the programme. The table shows the mean results and probability (p) values.

Fitness test	Before	After	t-test (p)
Speed (s)	14.17 (3.21)	11.64 (3.12)	0.03
Agility (s)	25.05 (6.21)	21.01 (5.83)	0.07
Reaction time (s)	4.85 (0.96)	3.21 (0.87)	0.04
Power-vertical jump (cm)	21.05 (6.17)	29.41 (6.54)	<0.01

Which fitness component shows no significant change?

- A. Speed
 - B. Agility
 - C. Reaction time
 - D. Power
29. A study investigated the effects of a carbohydrate-rich mouthwash on soccer players. The investigators used a double-blind protocol. What characterizes a double-blind study?
- A. The investigators and participants know who is given the carbohydrate-rich mouthwash.
 - B. The investigators know which participants are given the carbohydrate-rich mouthwash but the participants do not.
 - C. Neither the investigators nor the participants know which participants are given the carbohydrate-rich mouthwash.
 - D. The investigators know which participants are given a placebo but the participants do not.
30. What is required to calculate exercise intensity using the Karvonen method?
- A. Resting heart rate and maximum heart rate
 - B. Training heart rate range and maximum heart rate
 - C. Rating of perceived exertion and resting heart rate
 - D. Maximal oxygen uptake and heart rate
-

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